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ZOOLOGY.

E. RAY LANKESTER'S CONTRIBUTIONS TO A KNOWLEDGE OF RHABDOPLEURA.[1]—The tube is secreted by the disk or epistome, is wholly external to the animal shut off into chambers, one for each polypide.

The polypides present a body with the disk beneath it, mouth on either side under the disk, an arm with tentacles in a double row upon it, upon the opposite side of the body from the mouth the anus, body shaped like a sack with the intestine coiled and surmounted upon a stalk placed upon the mouth side. All this was known before. Lankester, by sections, demonstrates a space between the body wall and the gut wall partially filled with tissues, probably muscular and connective, which he calls the body cavity. The existence of a body cavity had not before been shown. Also upon the lower side of the main stack of the arms, near their base, L. finds a small ciliated pupilla which he thinks may be an osphradium. The lophophoral arms he considers the genetic equivalents of the ctenidia of Mollusca.

He demonstrates for the first time a sort of cartilaginous mesoblastic skeleton supporting the arms and the contractile cord. Finds the testis, not found by Allman or Sars, a blind sack opening by a special pore; this gonad belongs to Lankester's idiodinic gonads, and is not at all a modified nephridium. Allman's statoblasts are considered by Lankester to be undeveloped buds; buds which from some debility failed to burst through the chitinous tube and mature. In the absence of information upon the embryology, the affinities of Rhabdopleura cannot be definitely spoken upon. If the disk is the homologue of the epistome of Bryozoa, then it cannot be the homologue of the molluscan foot, since its position is dorsal, not ventral, and we may consider it homologous with the mantle, as suggested by Allman.—*Henry Leslie Osborn.*

THE LARGE IGUANAS OF THE GREATER ANTILLES.—The *Iguana tuberculata* is found in the Lesser Antilles, but not in the Greater. Those of Santo Domingo and the islands north and west of it belong to the three genera Aloponotus, Metopocerus and Cyclura. Of each of the first two genera but one species is known, the *M. cornutus* and the *A. ricordii.* Both genera differ from Cyclura in possessing two rows of femoral pores on each thigh, according to Duméril and Bibron. The *A. ricordii* is from Santo Domingo. The *M. cornutus* is said to be from the same island, but the authors of the Erpetologie Generale consider this uncertain. It is certain that some large lizards having a horny tuberosity on the muzzle inhabit that island.

Cyclura, as hitherto defined, does not, in the writer's opinion, differ from Ctenosaura, the species of which inhabit Mexico and Central America. But a character hitherto not recognized does separate the two genera nevertheless. That is the possession, by Cyclura, of corneous combs on some of the posterior digits, specialized from the ordinary lateral scales, which have also comb-like free edges in both genera. The species of this genus known to me are thus defined:

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[1] Quart. Journ. Mic. Soc., 1884, p. 622.

I. Scales of muzzle all small; combs on third toe only.

Several rows of infralabial scuta; five scales on canthus rostralis; crest interrupted at rump only.. *C. carinata* Harl.

II. Large scuta on muzzle; combs on third toe only; one row of large infralabials.

Infralabials and other scuta in contact with each other and with labials; two scales on canthus rostralis; crest much interrupted at nape and rump; color uniform; *C. bæolopha* Cope.

Infralabial and other scuta separated from each other and from labials by small scales; four scales on canthus rostralis; green, with bands.... *C. nubila* Gray.

III. Large scuta on muzzle; one on middle line protuberant; combs on second and third toes; several rows of large infralabials.

Scales regular, distinct on front of body: rudimentary spinous whorls on tail; crest high, interrupted at nape and rump; black............... *C. nigerrima* Cope.

Scales very irregular, minutely granular on scapular regions; no trace of whorls on tail; crest very low, much interrupted.................. *C. onchiopsis* Cope.

The *C. carinata* inhabits the Turks island, whence a specimen was brought to Philadelphia by Professor A. J. Ebell in 1868. The *C. nubila* is Cuban. It is the *C. harlani* of De la Sagra's history of that island. The *C. bæolopha* is from Andros island of the Bahama group (see Proceedings of Academy Philada., 1861, p. 123). The *C. nigerrima* is a new species from Navassa, Id., of which a full description will shortly appear in the Proceedings of the American Philosophical Society. It is allied to the *Metopocerus cornutus*. The *C. onchiopsis* is also new to science, and is represented by a large specimen from an unknown locality. On the summit of the muzzle are two pairs of large scuta in front of the median tuberosity, separated by granular scales. In *Metopocerus cornutus* there are said to be three pairs of these scales. This animal also differs from the *M. cornutus* in having eight superior labials; in the nasals being subround instead of triangular; in having a large instead of small symphyseal plate, and in its very low and even imperfect dorsal crest, with a wide interruption between the shoulders. In the typical specimen the temporal muscles are enormously developed, giving the profile a huge convexity behind. Strong longitudinal and transverse gular folds. Color dirty black. The very minute scales anteriorly remind one of the *Aloponotus ricordii*.

From the stomach I took several caudal vertebræ of a mammal as large as a porcupine, and skins of fruits.—*E. D. Cope.*

M. PAUL ALBRECHT'S IDENTIFICATIONS.—M. Paul Albrecht, in a series of articles, makes some startling identifications of homology between parts of the mammalian skull and elements present in the lower vertebrates.

By a course of reasoning based upon the examination of skulls in which ossification was defective at some point or other, this anatomist has found the quadrate bone of reptiles to be present in mammals in its normal position, but to synostose with the squamosal early in life; he has found the symplectic of the fish in the malleus of the mammal; he identifies the piscean hyomandibular with the incus, os orbiculare and stapes, basing his identification on an actual division of the columella which is known to occur; he finds the metapterygoid transformed into the squamosal; while he sees the ectopterygoid of the fish in the mammalian alisphenoid, the entopterygoid in the pterygoid and the preoperculum in the tympanic bones.

MM. Serres, Rambaad, Renault and Ihering agree in homologizing the postfrontal with the external orbital hypophysis of mammals, and M. Albrecht agrees in the identification.

In a communication relating to the "epipituitary spondylocenters of the skull" he traces the remains of the primitive passage of the dorsal chord through the series of vertebræ which form the basicranium. After leaving the basiotic part of the occipital, the passage, according to M. Albrecht, continues *above* the hypophysis in the clivus (dorsum sellæ) of the basipostsphenoid, and thence through the basipresphenoid, basiethmoid and basirhinoid or cartilage of the nose. M. Albrecht speaks of an adult mammal in which this basirhinoid was traversed throughout its whole length by the chorda dorsalis. In some cases (*Rhinoceros tichorhinus*) it may ossify as one bone, in others as a series of centers of vertebræ. Between these bones (craniostyle Albrecht) and the atlas our author counts seven vertebral centers, namely (counting backwards from the basiethmoid), the basipresphenoid, *basihypersphenoid*, *basianasphenoid*, *basiepisphenoid*, *basiorthosphenoid*, basiotic and basioccipital. The dismemberment of the basisphenoid into the four bones the names of which are italicised, is deduced from peculiarities found in certain mammalian skulls. Another result of this course of reasoning is the homologizing of the teleostean parasphenoid with that part of the basipostsphenoid which is not included in the clivus, and another that the trigeminal nerve of the Mammalia leaves the true cranium at the same spot which it pierces in the non-mammalian gnathostomes. A profile of the head of a fish is placed above a schematic figure of the lower jaw and temporal bone of an infant to show the perfect correspondence of the connections of the meta- and ectopterygoid bones with the alisphenoid and squamosal, and of the quadrate with the lower part of the same temporal. The symplectic and hyomandibular have, according to our author (Sur la valeur morphologique de la trompe d'Eustache) nothing to do with the hyoid arch. The mere fact that the symplectic gives origin to the cartilage of Meckel shows that it must belong to the mandibular arch. Besides this, the hyoid arch, in the rays, is attached behind these bones. The relations of the hyoid and mandibular arches to each other are traced through the various classes, and M. Albrecht maintains that the metapterygoid (squamosal), quadrate (quadrate part of temporal), ectopterygoid (alisphenoid), entopterygoid (pterygoid) and palatines form a premandibular visceral arch or rib. From this it follows that the spiracles (of selachians) and the eustachean tube are morphologically a premandibular branchial sac. Such branchiæ, in fact, exist in the spiracles of selachians.

M. Albrecht has recently returned to the attack in the *Biologischen Centralblatt*, in which (IV Band, Nr 23) he endeavors to prove from Fig. 308 of Kolliker's Entwicklungsgeschichte des Menschen und der hoheren Thiere, the correctness of his belief in the non-existence of Rathke's pouch. In the same periodical, (V Band, Nr 5 and 6) he records the discovery of seven bony vertebral centers in the cartilaginous nasal septum of a full-grown cow. His figures certainly shows seven small bones, in so far approximating an anterior tail.

In some observations recently made by our author before the Brussels Anthropological Society he treats of the posterior termination of man's vertebral column. Man, he says, is a tailless lower ape or lemur. Atavisms going back to the lemurs are more common in man than in any monkey. Through want of use he has lost "that registrar of the state of the mind," the tail. Yet man has really six or seven caudal vertebræ, two anchylosed with the three sacral vertebræ which enter into the sacro-iliac articulation, and four or five (in woman often five) coccygeal vertebræ. M. Albrecht maintains that post-coccygeal proto-vertebræ exist in some cases, and even believes in the occurrence of bone in the same region.

In another article our author gives figures of the manubria of six examples of Mycetes. In one only is the manubrium entire, and M. Albrecht correlates the fissured manubrium with the howling habit of this genus, necessitating space for the larynx.

In a memoir with the title, Intercostal Copulæ, Professor P. Albrecht reasons out and illustrates with diagrams and representations, the method of union between the paired processes of the vertebræ and the mode of origin of the sternal segments. He divides these processes into ribs (costæ) and costoids. The ribs are intermyocommatic, the costoids are interprotovertebral. The dorsal costoids are styled diacostoids; the ventral costoids, paracostoids. These costoids have their own center of ossification; when this is not the case they are replaced by di- and par-apophyses. Any adjacent pairs of ribs or costoids upon the same side may be conceived to unite while still cartilaginous. These two opposite pairs may unite. Osseous tissue may develop in each copula. This finally results in a sternebra which is intercostal, or intermediate between two successive pairs of ribs. A succession of these intercostal copulæ between the true ribs form a sternum. Just as the true ribs are linked by copulæ that are intermediate between two adjacent pairs, so are the costoids linked by intermediate copulæ, which may thus be distinguished as intercostoidal paracopulæ and diacopulæ. These par- and diacopulæ may develop between par- and diapophyses as well as between par- and diacostoids.

The views of M. Albrecht with regard to the evolution of what may be termed rib-junctions appear very plausible, but he coins some terrific polysyllables to explain their co-relations, as witness "diparatetradiacopulaire." This is worthy of organic chemistry.

PRESENCE OF A TAIL IN THE HUMAN EMBRYO.—Does the human embryo ever present at the posterior extremity of its body anything which deserves the name of a *tail?* This question has given rise to a debate which has not failed to be a lively one because necessary distinctions had not been made by the disputants, and because they did not confine themselves to a strict definition of terms.

It is at the outset necessary to distinguish between teratological cases and normal embryological phenomena; then it is necessary to agree as to the meaning of the word *tail.* Is this term applicable to any conical or cylindro-conical appendage of the posterior extremity of the back, formed of the tissues composing it, or should we reserve it for an organ containing a prolongation of the vertebral column? It is this last definition which should prevail; an appendage deprived of vertebræ is not a true tail in the anatomical sense of the word, but a simple caudal prolongation.

In the teratological cases described by MM. L. Gerlach, Bartels and Ornstein, the appendage, sometimes filiform, sometimes voluminous, does not contain an incontestible vertebra, and the total number of these osseous pieces does not pass beyond the regular number of normal man.

As regards young embryos it is impossible to decide the question if at the outset we do not determine the point where the caudal vertebræ begin. Should we place the limit at the point where the tail leaves the body? or should we be guided by the position of the anus? or better still should we call *caudals* all the vertebræ situated behind the sacrum? It is this last view which has prevailed in comparative anatomy, and we can say from this point of view that adult man possesses a tail, since it presents four or five coccygeal vertebræ situated behind the sacrum. The minimum, in this relation, is attained by the chimpanzee, which has only two or three coccygeal vertebræ.

Should we wish to apply the name of tail to the portion of the vertebral column situated behind the trunk, it would be necessary to bear in mind that from the age of three weeks and up to that of two months and onwards, the human embryo is fortified with this organ, because at this epoch the coccygeal vertebræ occupy the axis of a very distinct cylindrico-conical appendage, and which arises from the posterior extremity of the trunk. If, with M. His, we take for our guide the position of the anus, the tail will be shorter, but it will not cease to be very apparent, especially at the age of five or six weeks.

However, it is admitted as absolutely demonstrated, that this caudal appendage of the human embryo never contains any other vertebræ than those which are found in the coccyx of the adult. Ecker, who has given, with conviction, the name of tail to the posterior extremity of the human embryo, has declared that he has never met with supernumerary vertebræ. This author has himself studied the tail, very well formed, of a human embryo of 9^{mm} in length, and he describes and figures all the terminal part as constituted of an unformed blastema. M. His found there, however, a prolongation of the dorsal cord and spinal marrow, but no segmentation. Both admit that beyond the thirty-third or thirty-fourth vertebra there is no other portion of the skeleton. On this capital point my researches have led me to a result diametrically opposed to that of my predecessors. The errors of M. His arose from the fact that the embryos, the more advanced of which he made the reconstruction, those of 7^{mm} and a fraction, have precisely thirty-four myomeres, viz., thirty-three vertebræ, and he admits, without any other proof, that he was working over a definite stage.

I have had the honor of presenting to the academy a résumé of my anatomical study of a human embryo of $5\frac{6}{10}^{mm,}$ viz., one twenty-five days old. This embryo had no more than thirty-three somites, representing thirty-two vertebræ. There is then an increase of the number during the fourth week. This fact led me to seek whether this number might not increase still more during the fifth week, and my attempt did not fail! The human embryo of 9^{mm} to $10^{mm,}$ the age when the tail reaches its maximum length, *possesses a number of vertebræ greater than that of the adult.*

Two embryos of better appearance and perfectly fresh at the moment when they were sent me, have been photographed, and then treated with reagents and cut into microscopic sections. The series of sections are irreproachable, and one of the two sets, comprising 320 sections, has been entirely drawn, with the greatest pains, with the camera lucida. In comparing these 320 drawings it is easy to count, without any chance of error: 1st, the rachidian ganglion; 2d, the myomeres; 3d, the cartilages arising from the bodies of the vertebræ. These three counts control and mutually confirm each other, since all three give the same result, the human embryo of 8 to 9^{mm} has thirty-eight vertebræ.

This result is also confirmed by the examination of photographs of fresh pieces, for then can be easily distinguished thirty-five myomeres and, besides, a region occupying the outer fourth of the tail, where the limits are no more visible across the skin. But the sections prove to us that in this last quarter, contrary to the opinion of Ecker and of M. His, the mesoderm is divided with the greatest clearness into a double series of somites which extend to the last extremity of the tail, but presenting, it is true, dimensions regularly decreasing up to the thirty-eighth somite, which does not measure more than thirty-seven microns in diameter.

This fact is in no way teratological; it is plainly confirmed by several other embryos which I possess, all perfectly normal and of ages slightly different.

With the exception of the two last, all the caudal vertebræ have a blastema of a cartilaginous body similar, except in its dimensions, to that of any other vertebra of the series. The two last are only indicated by myomeres, perfectly distinct from the rest. The extremity even of the tail is formed by the termination of the medullary tube, only covered by the skin. The dorsal cord also extends very near this extremity.

The last caudal vertebræ have only a very ephemeral existence; already in embryos of 12^{mm} in length, viz., six weeks old, the thirth-eighth, thirty-seventh and thirty-sixth vertebræ become confounded in a single mass, and the thirty-fifth itself is not perfectly limited. An embryo 19^{mm} in length has no more than thirty-four vertebræ, the thirty-fourth evidently resulting from the fusion of the last four; at this period the tail as a whole is already much less prominent.

It results from these facts that the human embryo during the fifth and sixth week of its development, is provided with an undoubted normal tail which in form is regularly conical, elongated and which deserves, under all relations, the name which I have given it. This organ, evidently deprived of all physiological utility, should be classed in the number of representative organs. —*Professor H. Fol, in Comptes Rendus de l'Acad. Francaise, June 8, 1885.*

ZOOLOGICAL NEWS.—*Echinoderms.*—Professor. F. J. Bell (Proc. Zoöl. Soc., Dec. 18, 1883) describes *Anomalanthus lumidus*, a species of echinoid first described by the Rev. J. E. T. Woods as an Echinanthus. As the ambulacral pores are arranged in rows which are not closed or quite parallel, and which show a tendency to spread at their distal end, and as the under surface, though with the ambulacral sutures of Echinanthus, has not those sutures converted into conspicuous grooves, Professor Bell makes it the type of a new genus. It is found upon the eastern coast of Australia.——As one of a series of contributions to the systematic arrangement of the Asteroidea, Professor F. J. Bell (Proc. Zoöl.

Soc. London, 1884) gives a monograph of the genus Oreaster. He allows twenty-seven species, including *Nidorellia armata* of Gray, and gives a full description of each, with habitat, etc.

Mollusks.—Dr. Gwyn Jeffreys (P. Z. S) describes seventy-four species of Littorinidæ, Scalaridæ, etc., gathered by the *Lightning* and *Porcupine* expeditions. A large proportion are new.——Professor B. Sharp, in an address before the Biological section of the Academy of Natural Sciences of Philadelphia, gives the following as the development of the molluscan eye: (1) A pigmental surface of epithelial cells, as in Ostrea; (2) pigmented invaginated grooves for protection at centralized points of the body, each visual, all having a cuticular body, as in *Solen vagina* and *S. ensis;* (3) a sphere made of pigmented cells, the sphere formed by the contraction of the groove, as in Patella; (4) a cuticular lens formed by the centralization of the refractive bodies of each cell, as in Haliotis and Fissurella. In both these genera there is a distinct nerve of sight connected with the superior cephalic ganglion.——Mr. Chas. E. Beecher (36th report N. Y. State Mus. Nat. Hist.) describes some abnormal and pathologic forms of fresh-water shells. He figures a sinistral *Planorbis exacutus*, which is monstrous in every particular, and another with an expanded aperture, also abnormal examples of *Physa ancillaria*, *Valvata tricarinata*, *Gillia altilis*, *Somatogyrus subglobosus*, *Unio pressus*, *cariosus* and *complanatus.*——Professor B. Sharp maintains that the lens of the eye of the Vertebrata is homologous with a primitive invaginated eye, such as we now find in the Gastropoda, and that the layer of optic fibers of the retina is homologous with the primitive optic nerve. If the lens is the sphere of the mollusk, and the fibers of the retina the primitive optic nerve, the retina or ganglion opticum must be regarded as formed by an outgrowth of the brain, and the optic nerve of the vertebrate is really a secondary optic nerve.

Fishes.—Mr. W. R. O. Grant (Proc. Zoöl. Soc., 1884), contributes a revision of the fishes of the genera Sicydium and Lentipes. The first genus occurs throughout the torrid zone in fresh waters near the sea, and contains twenty-four species, five of them new to science. Lentipes occurs in the rivers of the Sandwich islands, and equals Sicyogaster Gill. Two species are known.

Reptiles.—Professor W. K. Parker (Trans. Zoöl. Soc. London, 1883), in his account of the structure and development of the skull in the Crocodilia, remarks that the skull of the Sauropsida is a mere specialization of the underlying ichthyic type. He considers that in some very important things the skull of the anurous Amphibia forms a better leading step to the mammal than that of the Sauropsida. The Crocodilia show in the earliest stage a compound nasal labyrinth. Only three of the visceral arches are developed, and only the first attains full size. In embryos from one and fivesixths to three and one-half inches long the whole of the chondrocranium, with its visceral arches, has become sauropsidan, and the investing bones are quite crocodilian in number and relation. The chondrocranium is better developed than in any existing reptile or bird. The mandibular arch in the crocodile is the culmination of the oviparous type. In the early stages the mandibular suspensorium is extremely like that of the more generalized selachians. There is a distinct suprastapedial element in the hyoid arch.

Birds.—The "cape wigeon" of Latham, and *Anas capensis* of Gmelin, is noted by T. Salvadori as occurring in Shoa. It is redescribed as *Querquedula capensis.*——Mr. R. B. Sharpe describes an apparently new nuthatch (*Sitta whiteheadi*) from the mountains of Corsica.

EMBRYOLOGY.[1]

ON THE GENESIS OF THE EXTRA TERMINAL PHALANGES IN THE CETACEA.[2]—In what manner the extra terminal phalanges of the second, third and fourth digits of the manus of such a type as Globiocephalus amongst Cetaceans, was evolved, has been a question which my studies gave little hope of satisfactorily answering until I had noticed that the bony digits of both the manus and pes in the pinnipeds are prolonged into the flat terminal integuments of the limbs far beyond the nails as unsegmented bars of cartilage, which are really unossified extensions of the ungual phalanges. The nails are borne upon the dorsal aspect of the ungual phalanges in pinnipeds, the ossified shafts of these phalanges usually ending abruptly to be continued into the terminal bars of cartilage. In Histriophoca the terminal cartilaginous extension of the last joints of the digits are quite rudimentary, but the point where the ungual phalanges abut distally upon the terminal cartilages is still visibly marked in this species. In the walrus, the fur-seal and sea-lion the terminal cartilages of the digits are more developed, and articulate directly with the abruptly truncated ends of the ungual phalanges. In the manatee the ungual phalanges of the manus terminate abruptly; that they support cartilaginous extensions of notable length seems improbable. The terminal cartilages of the digit apparently reach their greatest or strongest development in the walrus.

The foregoing data when interpreted by the aid of embryological theory, as actually observed to hold in other forms, and linked with the explanations afforded by other facts which will be given later on, will, it seems to the writer, gives us a rational hypothesis of the origin of the extra-terminal digits in the manus of the whales.

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[1] Edited by JOHN A. RYDER, Smithsonian Institution, Washington, D. C.

[2] This note presents the substance of conclusions reached by me in my memoir entitled, "On the development of the Cetacea, together with a consideration of the probable homologies of the flukes of cetaceans and sirenians," now in press.